

Correlations among the Topex/Poseidon atmospheric corrections, ionospheric correction, and ocean signals.

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In trying to assess whether the Topex ionospheric correction is better or worse than the Doris ionospheric correction without outside data on the ionosphere, it is found that strong correlations exist among the atmospheric (wet and dry tropospheric) and ionospheric corrections. The Topex/Poseidon sampling is such that the wet tropospheric correction has a non-causal but strong correlation with local time within one cycle, much as the ionospheric correction has for physical reasons.

A simple criterion on the quality of a correction, whether it does or not reduce the variance of the residuals after it is applied, is very hard to use because of these correlations. For example, inclusion of the inverse barometer correction makes it appear as if the wet tropospheric correction based on the radiometer were essentially useless, while failure to include it leaves an error in sea level that is correlated to atmospheric pressure. The reason for this effect is that inverse barometer is essentially four times the dry tropospheric correction, it does not fully model the response of the ocean to static atmospheric pressure, and whether included or not a large 'error' is left in the observed sea level that correlates with atmospheric pressure.

Any user trying to assess the quality of any atmospheric correction needs to become aware of these correlations to properly interpret the results.